one negative has been employed is due, as the authors say, to pressure of other work and to necessary alterations in the instrument, but they hope to repeat the investigation next autumn. In the table showing the positions, the authors compare their results with those of Vogel and Pihl, and they find that a small difference, depending on the adopted position of the fundamental star, is apparent between the former's declinations, while Pihl's right ascensions differ slightly, though systematically, this discrepancy being due very probably to the different methods of determining the parallels. The memoir concludes with a map showing the relative positions of the stars plotted direct from the x and y coordinates.

L'ASTRONOMIE.—The February number of this journal contains many articles of interest. Prof. Stanislas Meunier gives an account of a meteorite that fell in Algeria; this meteorite has proved to be of iron, containing as much as 91·32 per cent., and a polished surface, when treated with an acid, showed the well-known Widmannstätten figures. M. Flammarion, in addition to an account of "Les Pierres Tombées du Ciel," with reference to "Les Anciens Volcans de la Lune," lately advocated by Prof. Coakley in *Astronomy and Astrophysics*, gives the fourth out of six chapters dealing with the question, "Comment Arrivera la fin du Monde." M. J. Fényi, director of the Observatory of Kalocsa, gives an account of the enormous solar eruption (383,000 kilometres high) that occurred on October 3 last, while a short note on some curious appearances undergone by comet Swift includes six drawings by M. Lorenzo Kropp, taken between March 18 and April 25, and the three photographs taken at the Lick Observatory by Mr. Barnard, all of which indicate the results of tremendous actions, whether they be due to the influences of different forces, "attraction, repulsion, chaleur, électricité, or changements d'état, qui ajissement sur ses astres gazeux dans leur voisinage du soleil." M. Weinck of Prague describes the results of his examination of the Lick negatives with reference to the lunar crater Flammarion, and gives a drawing (which, by the way, can be well seen by half closing the eyes) of its surroundings, together with the three new craters. This number also includes a general summary of the meteorology of the preceding year, the results being given in diagrammatic form, bringing out clearly the diurnal and monthly changes.

JUPITER'S FIFTH SATELLITE.—Mr. Barnard, who has been continuing his observations with respect to the fifth satellite of Jupiter, communicates the results he has obtained to the *Astronomical Journal* (Nos. 285–86). The values of the elongation distances deduced from the measures at elongations are, for eastern elongation, 48″·089 (± 0·061), and for western elongation, 47″·621 ((± 0·176), the probable errors of a single determination being ± 0″·23 and ± 0″·47 respectively. These values are equivalent to the following distances:—

E.	elongation	112,500 ± 143 miles
W.	,,	111,412 ± 412 ,,

The values for the period he gives as

		h. m. s.
September 10–October 21 ...	$P =$	11 57 23·72
September 10–October 28 ...	$P =$	11 57 23·30
September 10 November 20	$P =$	11 57 22·73

the mean, when proportional weights are applied, being—

11h. 57m. 23·06s.

Among some other figures which Mr. Barnard gives are:—

Hourly motion	30°·111
Velocity in orbit	16·4 miles per second
Equatorial Hor. Par.	21° 51′

Distance from surface of Jupiter 67,000 miles (about).

While working at this satellite he has also been led to measure the equatorial and polar diameters of Jupiter himself, and the following numbers show the values he has deduced, the observations being made through smoked glass:—

Equatorial diameter	89,790 ± 65 miles
Polar ,, ...	84,300 ± 80 miles

GEOGRAPHICAL NOTES.

THE *Times* Berlin correspondent furnishes some interesting notes of Dr. Baumann's recent journeys in the region of the Nile sources, which confirm Mr. Stanley's identification of the Mountains of the Moon. In Urundi the kings were supposed to be lineal descendants of the moon, and the white traveller was hailed as being the returned ghost of a lately-deceased chief. On September 11 the expedition crossed the Akenyaru, which is not, as supposed, a lake, but a river, though the name "Nyanza" is often applied to it. Dr. Baumann also discovered that the so-called Lake Mworengo is in reality a river which flows into the Akenyaru, and came to the conclusion that there was no extensive sheet of water in Ruanda or North Urundi. On September 19 Dr. Baumann arrived at the source of the Kagera (Alexandra Nile), which rises at the foot of the precipitous and wooded hills which form the watershed between the basins of Rufizi and the Kagera. This mountain chain is known to the natives by the name of the "Mountains of the Moon," and is held in peculiar reverence by them. Here Dr. Baumann maintains the real source of the Nile to be, for if "it be acknowledged that the Kagera is the chief feeder of the Victoria Nyanza, it follows that the headwaters of the Nile can be none other than those of the Kagera itself in the Mountains of the Moon in Urundi, within the boundaries of German East Africa."

THE often-discussed scheme of an expedition to the North Pole by way of Franz Josef Land has been revived by Mr. F. G. Jackson, who proposes to lead an expedition next summer, if the means for equipping a ship are forthcoming. Mr. Jackson's plan is to travel with a small party, and establish a chain of depots northward from the most northerly accessible landing-place in Franz Josef Land. He would remain during winter in the most advanced post, and push on each summer with dog-sledges, until the pole is reached. The plan rests on the hypothesis of Franz Josef Land extending to the pole, just as Dr. Nansen's rests on the hypothesis of a transpolar current, but the evidence of the great extension of the land is not very satisfactory. Mr. Jackson's previous Arctic experience is not stated, nor is there any indication given as to whether he intends to travel at his own expense or to appeal for pecuniary help.

THE British South African Company have reserved the Zimbabwe Ruins and the area within a radius of one mile from the top of Zimbabwe Hill for archæological and scientific purposes, and no settlements, farms, or mines will be permitted within that radius.

A BEAUTIFULLY illustrated report on the regulation of Swiss torrents, by the late M. de Salis, has recently been published by the Swiss Government. The natural erosion and surface change which go on at the present day so rapidly among the steep slopes of a mountainous country as to be frequently cataclysmic in their intensity, have to be avoided or endured in inhabited regions. A frequent source of floods is the damming up of a large river by the mud and stones brought down by a freshet in a small tributary. The method of combating this effect is to build a succession of weirs, and cut a parallel canal so that the sediment is caught and the overflow regulated before the escaping water reaches the main valley.

MR. MACKINDER'S fourth Royal Geographical Society's educational lecture, delivered last week, dealt with Central Asian trade- and travel-routes, under the title of "The Gates of India and China."

TWENTY YEARS IN ZAMBESIA.

MR. F. C. SELOUS, the famous hunter and explorer of South Central Africa, gave a summary of his travels to the Royal Geographical Society on Monday evening. His address was illustrated by an exhibition of unusual interest in the tea-room, where a large collection of stuffed specimens of the characteristic African mammalian fauna was arranged. Photographs and various objects illustrative of the rapid development of Mashonaland since the Chartered Company took possession were also shown.

Mr. Selous commenced his African wanderings in 1871, and except for occasional visits to England he has travelled and traded in that continent ever since. In 1872 he and some companions penetrated into Matabeleland to hunt elephants, and had an amusing interview with the chief, Lo-Bengula. Although at that time not an explorer in the scientific sense, the accurate memory of his early wanderings over the country enabled Mr.

© 1893 Nature Publishing Group

Selous to successfully guide the Pioneer Force of the Chartered Company in 1890, when they took possession of Mashonaland.

With regard to the health of Zambesia he says:—"Owing to severe exposure to wet and cold during several days and nights, in the early part of 1872, I got an attack of fever and ague in Griqualand so that I was handicapped before starting for the interior. This fever and ague was exactly what I have seen people get on the high plateau of Mashonaland, during the last few years, from similar exposure to rain and cold. It took me some time to shake off, and was still in my system when I reached Matabeleland, but the attacks only came on when I halted anywhere for a few days. During November and December, 1872, hunting down in the low hot country towards the Zambesi, I was again very much exposed to wet, and on several occasions lay out all night long, without any shelter, drenched through with such heavy rain that it put out the largest fire and converted hard ground into a swamp. I naturally again got soaked with fever poison, but as long as I remained hunting the disease did not show itself. Directly I got back to Bulawayo it broke out, and during a month or so I had several sharp attacks. By that time, however, my sound constitution had choked all the fever germs, and from that day until in 1878, when very severe exposure in Central Africa once more filled me up with malarial poison, I do not remember ever to have had one single hour's illness, or to have taken one drop of medicine. The life I led was, however, if a very hard, at any rate, in many respects, a very healthy one; for the most part I ate nothing but meat and Mashona rice, and drank nothing but tea, usually without milk and sugar—not because I like it so, but because those adjuncts were unobtainable."

North of the Zambesi Mr. Selous made several journeys among the Batongas, and spent a wretched rainy season, almost without equipment, on the Manica table-land. After the rains the country looked charming. The young grass, thanks to the recent heavy rain, had shot up one foot or eighteen inches in height over hill and dale, every tree and shrub was in full leaf, and everything looked green, and fresh, and smiling. Many of the shrubs on the edge of the hills bore sweet-smelling flowers, and, as on all the plateaus of the interior of Africa, small but beautiful ground-flowers were very abundant.

Interesting observations were made on some of the northern rivers. The curious phenomenon of the steady rise of the waters of the Chobe and Machabi—an outlet of the Okavango—was observed from the first week in June until the last week in September, when they commenced to recede. That the Okavango and the Upper Kwando are connected on their upper courses, there can be little doubt, as the waters of the Machabi went on rising suddenly *pari passu* with the Chobe, until the end of September, when both commenced to recede simultaneously.

The explanation of this remarkable phenomenon is difficult, as there are no snow mountains at the sources of the Kwando and Okavango rivers and the Zambesi, which rises in the same latitude, decreases steadily in volume from day to day during the dry season like almost all other rivers in South Central Africa. Besides the channels which still become annually filled with water from the overflow of the Chobe and Okavango river systems, there are many others which are now quite dry, but in which the natives say they once used to travel in canoes.

From 1882 the journeys acquired additional geographical importance, and Mr. Selous proceeded to rectify the maps of Mashonaland laid down by earlier travellers, taking constant compass bearings, sketching the course of rivers, and fixing the position of the junction of tributaries. The value of this work was made manifest in a magnificent large scale map of the country, drawn as well as surveyed by Mr. Selous, which was used to illustrate the lecture. It would be impossible, without practically reproducing the whole address, to do justice to the immense variety and solid value of the contributions to African geography made by this most energetic of pioneers; or to the thrilling adventures, the recital of which was listened to with breathless attention and greeted with the heartiest applause. With the exception of a treacherous night attack made upon his camp by the Mashuku-sumbwe, led by a few rebel Marotse, in 1888, he had never had any other serious trouble with the natives. During his twenty years' wanderings he went amongst many tribes who had never previously seen a white man, and he was always absolutely in their power, as he seldom had more than from five to ten native servants, none of whom were ever armed.

THE DISTRIBUTION OF POWER BY ELECTRICITY FROM A CENTRAL GENERATING STATION.

On Friday evening, the 3rd inst., Mr. A. Siemens delivered at the Royal Institution an interesting lecture on the ways in which science is applied to practice. In the course of the lecture he made the following remarks on the distribution of power by electricity from a central generating station:—

Before entering further into this, let me remind you that the earliest magneto-electric machines were used nearly sixty years ago for the production of power. I will mention only Jacobi's electric launch of 1835 as an example. It must, therefore, be considered altogether erroneous to ascribe the invention of the transmission of power to an accident at the Vienna Exhibition in 1873, when, it is said, an attendant placed some stray wires into the terminals of a dynamo machine; it began to turn, and the transmission of power was first demonstrated. As a matter of fact, Sir Wm. Siemens once informed me, that his brother Werner was led to the discovery of the dynamo-electric principle by the consideration that an electro-magnetic machine behaved like a magneto-electric machine, when a current of electricity was sent into it, viz. both turn round and give out power. It was, of course, well known that a magneto-electric machine produces a current of electricity, when turned by mechanical power, and Werner concluded that an electro-magnetic machine would behave in the same manner. We all know that he was right, but I relate this circumstance only as a further proof that the generation of power by electric currents has been a well-known fact long previous to the Vienna Exhibition.

Another well-known instance of transmission of power to a distance is furnished by the magneto-electric ABC telegraph instruments, where the motion at the sending end supplies the currents necessary to move the indicator at the receiving station.

As an illustration of the distribution of power by electricity, I will briefly describe some radical alterations that have been made at the works of Messrs. Siemens Brothers and Co., by the introduction of electric motors in the place of steam engines.

[A diagram on the wall showed in outline the various buildings in which work of different kinds is carried on with the help of different machines.]

Electric motors are supplying the power, sometimes by driving shafting to which a group of tools is connected by belting, and sometimes by being coupled direct to the moving mechanism. Each section of the works has its own meter, measuring the energy that is used there, and all of them are connected by underground cables to a central station, where three sets of engines and dynamos generate the electric current for all purposes. There are two Willans and one Belliss steam engines, each of 300 horse-power, coupled direct to the dynamos, and running at a speed of 350 revolutions per minute. Room is left for a fourth set, but including some auxiliary pumps and the switch-boards for controlling the dynamos and for distributing the current, the whole space occupied by 1200 horse-power measures only 32 × 42 feet. Close by are the condensers and three high-pressure boilers, which have replaced some low-pressure ones formerly used for some steam engines driving the machinery in the nearest building.

The advantages that have been secured by the introduction of electric motors may be briefly stated under the following heads:—

1. Various valuable spaces formerly occupied by steam engines and boilers have been made available for the extension of workshops, and these are indicated on the diagram by shading.
2. By abolishing to a great extent the mechanical transmission of power a considerable saving is effected in motive power, which is especially noticeable at times when part only of the machinery is in use.
3. As the electric motors take only as much current as is actually required for the work they are doing, a further saving is effected, and at the same time the facility with which the speed of the motors can be altered without their interfering with each other presents a feature that is absent from mechanical transmission.
4. The big steam engines being compound and condensing, produce a horse-power with a smaller consumption of fuel than the small high-pressure steam engines scattered throughout the works.

© 1893 Nature Publishing Group